

JAN

1985-86
CATALOG NO. 29
(Supersedes No. 28)

QUARTZ CRYSTAL CATALOG



Prices subject to change
without notice



QUALITY MAKES THE DIFFERENCE...

QUARTZ CRYSTALS

INTRODUCTION

Since 1965, JAN CRYSTALS has been manufacturing quality crystals for the Industry, Military Services, Radio Amateur, Citizens Band and experimenters.

Our crystals are made from the best material available and precisely manufactured to rigid specifications utilizing the latest developed electronic testing equipment operated by highly skilled and trained personnel.

QUALITY ASSURANCE: All crystals are inspected in our Quality Control Department prior to shipment which will insure you of receiving the finest product possible.

ENGINEERING: Our experienced crystal engineers gladly respond to your varied crystal requirements. They will assist you in determining if your crystal is a standard type or requires a custom design. Special attention is given to prototype requests, and suggestions are offered in your crystal oscillator design.

CRYSTAL THEORY

Crystals are made from crystalline quartz SiO_2 and the type of "Cut" used in the range of 1-110 MHz is called the "AT-Cut" which has a zero temperature coefficient at room temperature with an approximate angle of cut of $35^\circ 15'$. The "AT-Cut" has a thickness shear of vibration which is either a fundamental, third or fifth overtone.

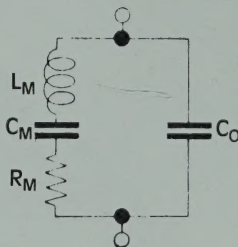
THE EQUIVALENT CIRCUIT

L_M — Dynamic or Motional Inductance (mH)

C_M — Dynamic or Motional Capacitance (fF) (10^{-15}F)

R_M — Equivalent Series Resistance (ohms)

C_0 — Parallel or Static Capacitance (pF)



Note: 1. L_1 , C_1 & R_1 are not true electrical components. They are apparent values of Inductance, Capacitance and Resistance which serve to model the mechanical/piezoelectric performance of the vibrating crystal in the region of resonance.

CIRCUIT EQUATIONS — Basic Crystal

F_s = series resonance freq.

F_p = parallel resonance freq.

C_L = parallel load capacitance

$$C_M = \frac{2(C_0 + C_L) \Delta F}{F_s}$$

$$Q = \frac{2 \pi F_s L_M}{R_M}$$

$$\Delta F = F_p - F_s$$

$$L_M = \frac{1}{4 \pi^2 F_s^2 C_M}$$

$$F_s = \frac{1}{2 \pi \sqrt{L_M C_M}}$$

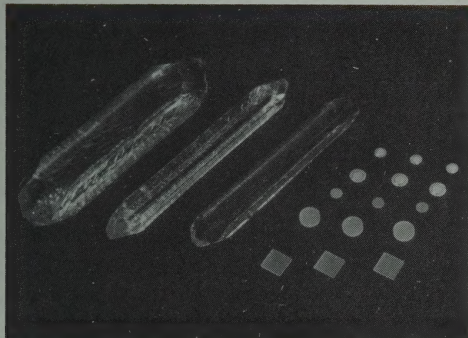
$$\frac{C_0}{C_M} \text{ Capacitance Ratio}$$

Normal measured parameters are F_s , F_p , C_0 , R_M . All other parameters are calculated using consistent units in the above equation, eg. farads, henry, etc.

4-DAY WEEK JAN CRYSTALS operates on a 4-Day Work Week, resulting in greater efficiency and reduced cost. Monday thru Thursday). Our aim is constant improvement at minimum cost for our customers.

Manufacturing Technology

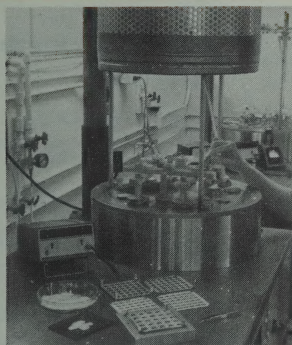
The manufacturing of quartz crystals demands a constant high degree of process standards, exact dimensioning and precise electronic measurements.



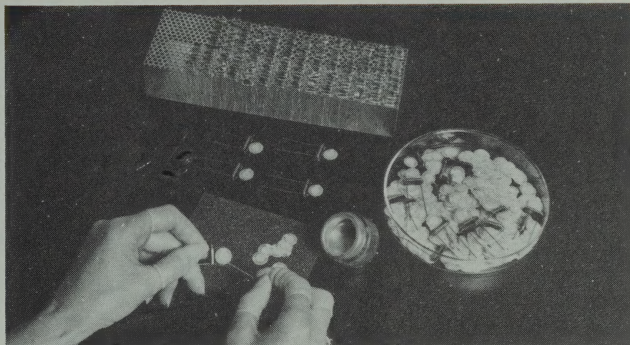
High Q-quartz angles X-ray measured



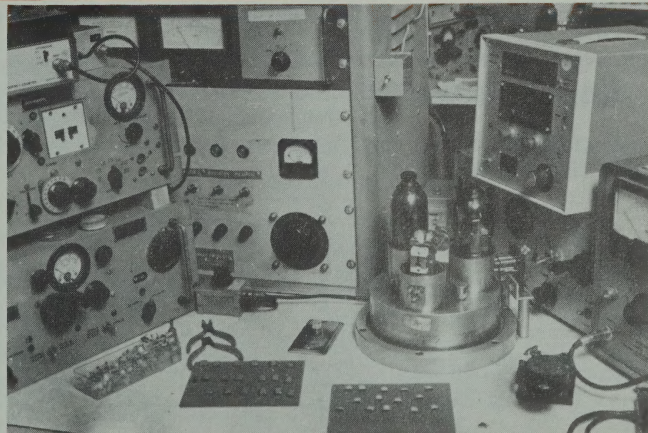
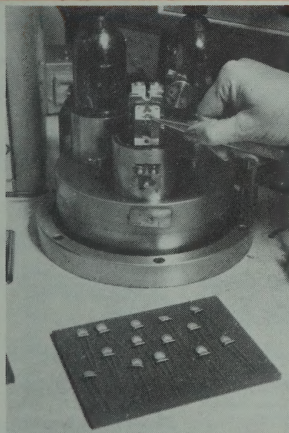
Radio/Freq. controlled lapping close surface tolerances



Base-plating of electrodes using vacuum thin film deposition



Mounting and cementing of each individual crystal



Final frequency adjustment of crystals using exclusively a thin metal film deposition under high vacuum.

NEW TOLL FREE NUMBER 1-800-237-3063

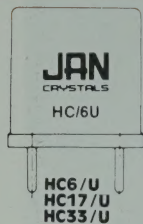
CALL TOLL FREE IN U.S.A. EXCEPT FLORIDA, ALASKA AND HAWAII

Telephone: (813) 936-2397



Crystal Units

Fundamental Mode 1.0-20.0 MHz
METAL HERMETICALLY SEALED



Frequency Range -MHz-	Calibration Tolerance			Oven $\pm .002\%$ 75°C/85°C	Max. Drive Level
	$\pm .005\%$	$\pm .0025\%$	$\pm .001\%$		
1.001- 1.699	\$9.00	\$10.00	\$11.00	\$12.00	1.000-7.000 MHz
1.701- 1.999	8.00	9.00	10.00	11.00	
2.000- 2.500	6.50	7.50	8.50	9.50	
2.501- 6.000	5.50	6.50	7.50	8.50	
6.001-12.000	5.75	6.75	7.75	8.75	7.000-21.000 MHz
12.001-17.000	6.00	7.00	8.00	9.00	
17.001-20.000	6.50	7.50	8.50	9.50	

The above frequencies only in holders HC6/U, HC17/U, HC33/U.

2 M. Watt

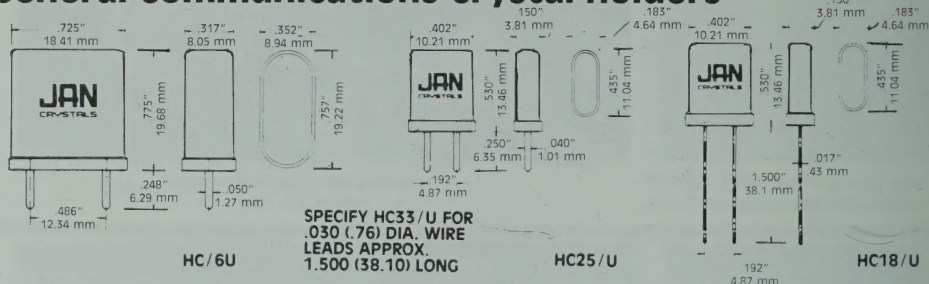
Fundamental mode crystals available in HC25/U, HC18/U miniature holders.



Frequency Range -MHz-	Calibration Tolerance			Oven $\pm .002\%$ 75°C/85°C	Maximum Drive Level
	$\pm .005\%$	$\pm .0025\%$	$\pm .001\%$		
2.900- 3.500	\$8.50	\$9.50	\$10.50	\$11.50	2 M. Watt
3.501- 3.999	7.50	8.50	9.50	10.50	
4.000- 4.999	6.50	7.50	8.50	9.50	
5.000-12.000	5.00	6.00	7.00	8.00	
12.001-17.000	6.00	7.00	8.00	9.00	
17.001-20.000	6.50	7.50	8.50	9.50	

For non-standard holders HC32/U or short cans \$1.00 extra.

General Communications Crystal Holders

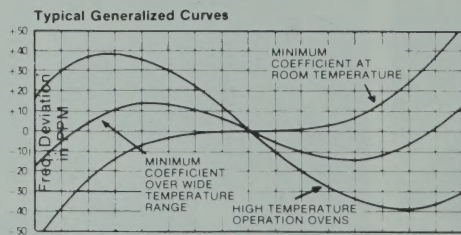


**SPECIFY HC33/U FOR
.030 (.76) DIA. WIRE
LEADS APPROX.
1.500 (38.10) LONG**

General Data The above outlined crystal units are made from the "AT"-element and have a thickness-shear mode of vibration.

Standard U.S. military specifications are used as a guide line in the manufacturing of our commercial grade crystals.

Commercial Grade Crystals have a typical freq/temp curve of $\pm .005\%$ from -40°C + 90°C $\pm .003\%$ from -20°C + 60°C



**Approximate
Equivalent Series
Resistance**

FREQUENCY MHz	E.S.R. ohms
1.000	540
1.500	410
2.000	290
3.000	150
4.000	75
5.000	60
7.000	35
10.000	24
20.000	20

**Maximum Shunt
Capacity: 7 picofarad.**

NEW TOLL FREE NUMBER

1-800-237-3063

CALL TOLL FREE IN U.S.A. EXCEPT
FLORIDA ALASKA AND HAWAII

Telephone: (813) 936-2397

Crystal Units

High Frequency 15 MHz-100 MHz 3rd and 5th Overtone HERMETICALLY SEALED

Calibration tolerance

Overtone	Frequency Range -MHz-	± .005%	± .0025%	± .001%	Oven ± .002% 75°C/85°C	Maximum Drive Level
Third	15.0- 21.0	\$7.50	\$8.50	\$9.50	\$10.50	1-2 M. Watt
Third	21.1- 52.0	6.50	7.50	8.50	9.50	
Third	52.1- 60.0	7.00	8.00	9.00	10.00	
Fifth	52.0- 85.0	6.50	7.50	8.50	9.50	
Fifth	85.1-100.0	7.50	8.50	9.50	10.50	

Above 100 MHz on Special Request. The overtone mode crystals are available in all holders HC6/U, HC33/U, HC17/U, HC25/U, HC18/U.

TYPICAL ELECTRICAL EQUIVALENT PARAMETERS

The overtone AT element vibrates in the thickness-shear mode on its low-order, odd-integral harmonic frequencies, or overtones. Overtone operation allows considerable raising of the upper frequency limit in this crystal cut. Most overtone AT elements operate on third or fifth overtones;

Approximate Equivalent Series Resistance (Typical)

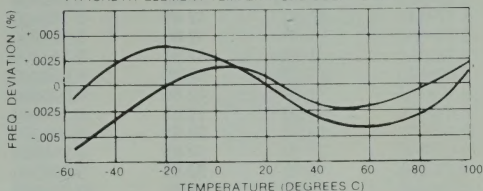
FREQUENCY -MHz-	E.S.R. ohms
15.0- 60.0 (3rd)	40
52 -110.0 (5th)	60

Maximum Shunt Capacity: 7 picofarad

Drive Level

It is important to remember that for optimum performance, the lowest possible drive level should always be employed.

TYPICAL AT ELEMENT TEMPERATURE COEFFICIENT



Low Frequency Crystals 16-1000 KHz

Element	Freq. Range	Holder	Calibration Tol. ± .01%
NT	16-59 KHz	HC-13/U	— \$30.00
NT	60-90 KHz	HC-13/U	— \$30.00
X + 5	90-200 KHz	HC-13/U	— \$22.00
SL/DT	190-600 KHz	HC-6/U	— \$20.00
SL/CT	600-1000 KHz	HC-6/U	— \$22.00

QUANTITY PRICES AVAILABLE UPON REQUEST

Recommended Drive Level:

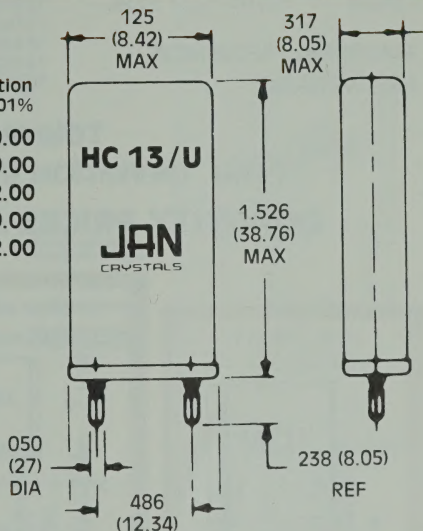
16 KHz — 80 KHz .1 mW
80 KHz — 1040 KHz 1-2. mW

"SPECIAL" Frequency "Standards" Shipped From Stock

1000 KHz, Tol. ± .005%, HC-6/U

100 KHz, Tol. ± .01%, HC-13/U

STAND. LOAD CAP 32pF **\$6.50** ea.



SPECIFY WIRES
.030 (.76) DIA. WIRE —
LEADS APPROX. 1.500
(38.10) LONG

Microprocessor Crystals

- Low E.S.R.
- Close tolerance
- Stability (Long Term)

Frequency Mhz	HC 33/U Quantity 1-9	HC 33/U Quantity 10-24	Frequency Mhz	HC 18/U Quantity 1-9	HC 18/U Quantity 10-24
1.843200	\$4.50	\$3.60	3.276800	\$6.50	\$5.50
2.000000	\$4.50	\$3.60	3.330000	\$6.50	\$5.50
2.012000	\$4.50	\$3.60	3.579325	\$3.00	\$2.85
2.097152	\$4.50	\$3.60	3.579545	\$3.00	\$2.85
2.457600	\$4.50	\$3.60	3.600000	\$3.00	\$2.85
2.500000	\$4.50	\$3.60	3.932160	\$3.00	\$2.85
2.667000	\$4.50	\$3.60	4.000000	\$3.00	\$2.85
3.000000	\$3.00	\$2.85	4.194304	\$3.00	\$2.85
3.200000	\$3.00	\$2.85	4.915200	\$3.00	\$2.85
3.276800	\$3.00	\$2.85	5.000000	\$3.00	\$2.85
3.330000	\$3.00	\$2.85	5.068800	\$3.00	\$2.85
3.579545	\$3.00	\$2.85	5.185000	\$3.00	\$2.85
3.600000	\$3.00	\$2.85	5.585000	\$3.00	\$2.85
3.932160	\$3.00	\$2.85	5.714300	\$3.00	\$2.85
4.000000	\$3.00	\$2.85	5.850000	\$3.00	\$2.85
4.194304	\$3.00	\$2.85	6.000000	\$3.00	\$2.85
4.434000	\$3.00	\$2.85	6.144000	\$3.00	\$2.85
4.440000	\$3.00	\$2.85	6.400000	\$3.00	\$2.85
4.550000	\$3.00	\$2.85	6.553600	\$3.00	\$2.85
4.750000	\$3.00	\$2.85	8.000000	\$3.00	\$2.85
4.915200	\$3.00	\$2.85	10.000000	\$3.00	\$2.85
4.956200	\$3.00	\$2.85	12.000000	\$3.00	\$2.85
5.000000	\$3.00	\$2.85	13.516800	\$3.00	\$2.85
			15.000000	\$4.00	\$3.20
			18.432000	\$5.00	\$4.00
			19.660800	\$5.00	\$4.00
			20.000000	\$5.00	\$4.00

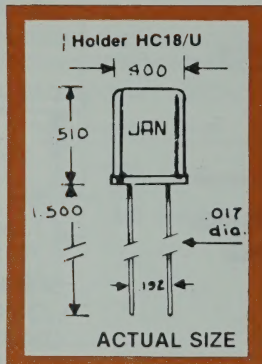
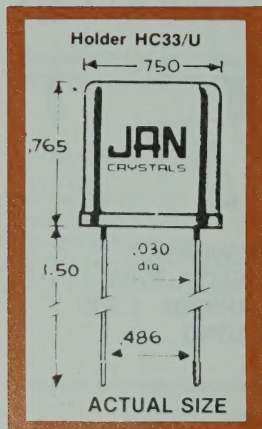
ADDITIONAL FREQUENCIES
ARE AVAILABLE.

When
ordering
Please
specify:
MP-Crystal



FOR FAST DELIVERY . . .
We Welcome your
Master Charge or Visa
Please give exact numbers
and expiration date.

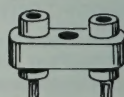
Tolerance at 25°C ± .005%
Freq. deviation 0 to 70°C Max ± .01%
QUANTITY PRICES AVAILABLE ON REQUEST



**Crystal Sockets
Order by Number**



CE-25 . . . 30¢
NY REG: Low
Loss Socket,
P.C. Mounting
for HC25/U
Type Crystal



CE-1 . . . 30¢
NY REG: Low
Loss Socket for
HC6/U Holder -
1/4" Pin Spacing
- .05" Holes



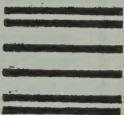
SSO-1 . . . 30¢
Single Socket
for HC17/U,
FT-243 or FT-241
LOW LOSS
BAKELITE

Name

Street

City

Zip



BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 422 FORT MYERS, FLORIDA

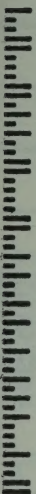
POSTAGE WILL BE PAID BY ADDRESSEE

JAN CRYSTALS

2400 CRYSTAL DRIVE

P. O. BOX 06017

FORT MYERS, FLORIDA 33906-9989



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



to return defective goods. Only properly will be accepted for

der; tolerance at room temperature; load capacity (standard oven or non-oven.

MAILING

Y order?

nce at factory.
out notice.

- Did you enclose check/mc
- Is your address complete?
- All orders subject to acceptance
- Prices subject to change w/o notice

READ BEFORE

Frequency; type of series/parallel resonances are 20pF, 30pF, 32

When ordering, specify the following

NOTE: Do not use this envelope if the crystals are packaged in replacement.

Scanner Crystals

LOW BAND 30-49 MHZ

V.H.F. BAND 150-174 MHZ

U.H.F. BAND 450-470 MHZ

Tolerance:

$\pm .0025\%$ or 25 p.p.m. **\$3⁵⁰ea.**

$\pm .001\%$ or 10 p.p.m. **\$4⁵⁰ea.**

AIRCRAFT FREQUENCIES 118-138 MHZ $\pm .0025\%$ or 25 p.p.m. **\$6⁵⁰ea.**

TYPE OF HOLDERS: HC-6/U, HC-18/U, HC-25/U

Commercial Monitors and Pagers: Repco, Pllectron, Motorola, G.E., etc. are priced separately.

Marine Crystals

MARINE CHANNELS ONLY

\$5⁰⁰ea.

For $\pm .001\%$
add \$1.00

If 30 day aging
is required
Price per crystal
\$9.00 ea.

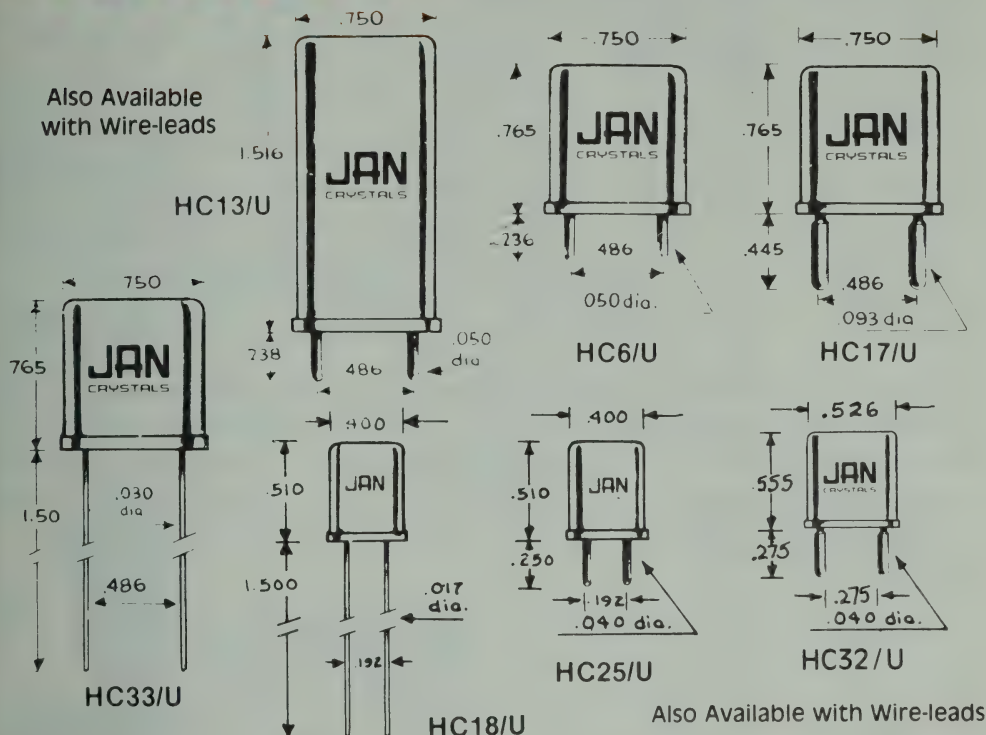
Always specify

manufacturer, make, model, operating frequency or channel.

FOR "CONVERTED COMMERCIAL EQUIPMENT"
SEE OUR STANDARD CATALOG PRICES

Holders

Actual Size of
Standard Holders Available



Amateur Band Crystals 2 Meters

Accuracy: $\pm .0025\%$

VHF 144-148 MHZ

Transmit or Receive

V.H.F. BAND **\$3.50** ea.



We maintain technical information on most popular Amateur 2-Meter F.M. Transceivers.

- Drake
- Genave
- Heathkit
- Hygain
- Icom
- Kenwood
- Lafayette
- Midland
- Pace
- Realistic
- Regency
- Sears
- Standard
- VHF Engineering
- Sunar
- Swan
- Tempo
- Wilson
- Yaesu
- Pearce Simpson

$\pm .001\%$, add \$1.00 to above price.

All 2-Meter Crystals in HC25/U Holders Only.

When ordering please specify crystal type, frequency, make of equipment, model number and whether Transmit or Receive.

IMPORTANT: 2 Meter Crystals ordered for converted VHF-Commercial Transceivers (Motorola, R.C.A., G.E.) are priced \$6.00 per Crystal (Transmit or Receive) for non-oven types. Oven type Crystal \$8.00 ea.

U.H.F. BAND 220 MHZ Tolerance: $\pm .001\%$ or 10 p.p.m.

MIDLAND-REGENCY-WILSON V.H.F. ENGINEERING - B & K COBRA ETC

\$7.50 ea.

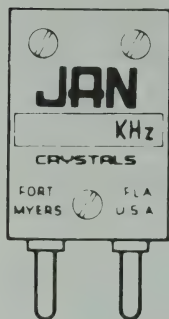
Amateurs From Novice ... to General ...

FT-243 HOLDER

Pressure Mount

Operating Range

crystal freq.



40-meter general	7,025 to 7,300	fund.	7025-7300
40-meter novice	7,100 to 7,150	fund.	7100-7150
20-meter general	14,025 to 14,350	double	7015-7175
20-meter general	14,025 to 14,350	triple	4675-4780
15-meter general	21,025 to 21,450	triple	7008-7150
15-meter novice	21,100 to 21,200	triple	7034-7082
10-meter general	28,000 to 29,700	X4	7000-7425
10-meter novice	28,100 to 28,200	X4	7025-7050
6-meter gen. & tech.	50,100 to 54,000	X6	8350-9000

\$3.00 ea.

$\pm .01\%$ TOLERANCE
32pF Load Capacity

80 METER NOVICE

3701 KHz to 3749 KHz

\$3.50 Ea.

Frequency Range — 2010KHz to 8900KHz

Tolerance at 25°C $\pm .005\%$

FT-243 Holder $\pm .005\%$ 32pF Load Capacity

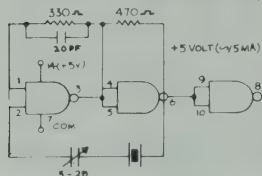
\$4.50 ea.

Exclusively Suggested for 3.5 - 8.6 MHz. Amateur Crystals

QUAD 2-INPUT TTL NAND GATE 7400 (E OR N)

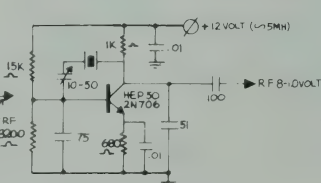
3.5 - 8.6 MHz FUNDAMENTAL (ONE SECTION OMITTED)

S, LS, or H versions may not be suitable — CORRELATION 32pF



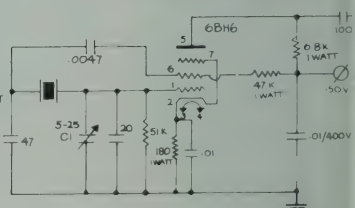
TRANSISTOR "NPN" OSCILLATOR 3.5 - 8.6 MHz FUNDAMENTAL

CORRELATION 32pF
ALL 1/2 WATT RESISTORS



FUNDAMENTAL OSCILLATOR 3.5 - 8.6 MHz

C, FINAL FREQUENCY ADJUSTMENT
CORRELATION 32pF
TUBE 6BH6 OR EQUIVALENT



CB crystals

Standard "CB" crystals
Transmit or Receive
High Stability • Low E.S.R.

When ordering, specify MFG. NAME, MODEL, CHANNEL FREQUENCY, HOLDER TYPE HC-6, HC-18, HC-25.

Tolerance: $\pm .005\%$

\$2.50 ea.

Standard CB Channels only

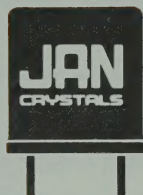
CB FREQUENCIES

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	26,965	21	27,215
2	26,975	22	27,225
3	26,985	23	27,235
4	27,005	24	27,245
5	27,015	25	27,255
6	27,025	26	27,265
7	27,035	27	27,275
8	27,045	28	27,285
9	27,055	29	27,295
10	27,065	30	27,305
11	27,075	31	27,315
12	27,085	32	27,325
13	27,105	33	27,335
14	27,115	34	27,345
15	27,125	35	27,355
16	27,135	36	27,365
17	27,145	37	27,375
18	27,155	38	27,385
19	27,165	39	27,395
20	27,175	40	27,405

Tolerance: $\pm .0025\%$

\$3.00 ea.

**SPECIAL
 CUT FREQUENCY**
\$6.50 ea. T or R.



**KEEP
 YOU ON
 THE AIR**

Non-standard "CB" crystals
For Synthesizer and Phase Lock Loop
High Stability — Tolerance: $\pm .0025\%$
Made to Manufacturers Specifications.



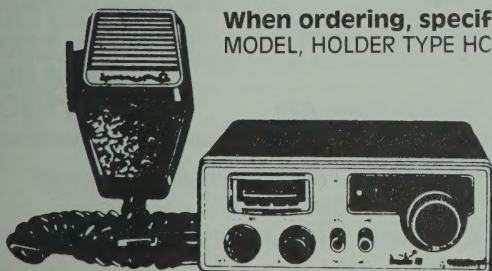
Frequency Range — 6-17 MHz Fund. Mode
22-25 MHz } Third Mode
30-42 MHz }

When ordering, specify MFG. NAME, MODEL, HOLDER TYPE HC-18, HC-25.

\$3.00 ea.

SPECIAL CUT CRYSTALS

\$6.50 ea. T or R.



When ordering, specify the following

- Crystal Frequency
- Holder Type
- Tolerance in %

- Series/Parallel Resonance
- Crystal Load Capacity (CL)
Oven or Non-Oven

Standard CL are 20pf, 30pf, 32pf, 50pf

E.O.D. EMERGENCY ORDER DEPARTMENT

- Our Emergency Order Department (E.O.D.) is set up to supply crystals on a rush basis for an additional cost.
- E.O.D. ordered crystals will be shipped within 3 working days after receipt of order.
- E.O.D. orders should not exceed 10 crystals per order.
- When ordering by phone please **stipulate** E.O.D. service.

HOW TO ORDER TERMS

- Send check/money order for FULL AMOUNT of order.
- Request C.O.D.
- C.O.D. orders are not to exceed \$200.00 per order.
- C.O.D. orders for \$100.00 or more (25% deposit).
- We accept credit cards

Please give exact card numbers and expiration date.



POSTAGE & HANDLING

First Class Mail & Packaging add .40 per crystal
On Orders under \$20.00 (outside the U.S.A. via Air Mail) . add 1.35 per crystal
On Orders over \$20.00 (outside the U.S.A. via Air Mail) . add 1.00 per crystal

U.P.S. SERVICE

Minimum Charge

UPS CHARGES ARE SUBJECT TO CHANGE

Common Carrier UPS	\$ 2.50
Blue Label Air (where available)	\$ 4.00
Red Label Air (where available) Next Day Air	\$11.50

SALES TAX: Orders placed within the State of Florida require 5% Sales Tax. Make check or money order payable to:

JAN CRYSTALS, 2400 CRYSTAL DRIVE • P.O. BOX 06017 • FT. MYERS, FLA. 33906-6017
813/936-2397

Ordering Information

NEW TOLL FREE NUMBER

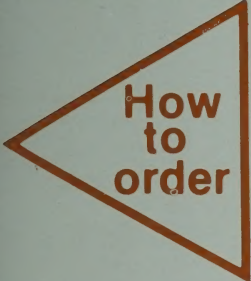
1-800-237-3063

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2. OPERATING FREQ.
3. CRYSTAL FREQ. AND/OR FORMULA.
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6. LOAD CAPACITANCE AT PARALLEL RESONANCE IN PF.
7. MODE OF OPERATION: I.E. FUND; THIRD; FIFTH.
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EXAMPLE: $\pm .002\%$ AT 25°C.

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- WHENEVER POSSIBLE, SEND SAMPLE CRYSTALS KNOWN TO BE ON FREQ. THESE WILL BE RETURNED WITH YOUR ORDER.

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Indicate CR type number per Mil-C-3098 and specify the desired frequency.

CLAIMS: CLAIMS FOR DEFECTIVE WORKMANSHIP OR DAMAGED CRYSTALS MUST BE MADE IN WRITING WITHIN 30 DAYS AFTER RECEIVING THE SHIPMENT.

DISCREPANCY IN COUNT MUST BE REPORTED WITHIN 10 DAYS AFTER SHIPMENT, OR THE COUNT IS CONSIDERED CORRECT.

RETURNED MATERIAL CRYSTALS RETURNED FOR REPLACEMENT MUST BE ACCOMPANIED BY A COMPLETE EXPLANATION OF THE DEFECT.

CRYSTALS RETURNED BECAUSE OF CUSTOMER ERROR WILL BE ACCEPTED FOR \$1.00 PER CRYSTAL CREDIT AGAINST NEW ORDER.



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